# Holistic School Behavioral Health Symposium

## Bridging motor and mental health development promotion in schools: the opportunity of new technologies and methods

Rodrigo Lima, PhD
Fundació Sant Joan de Déu, Spain

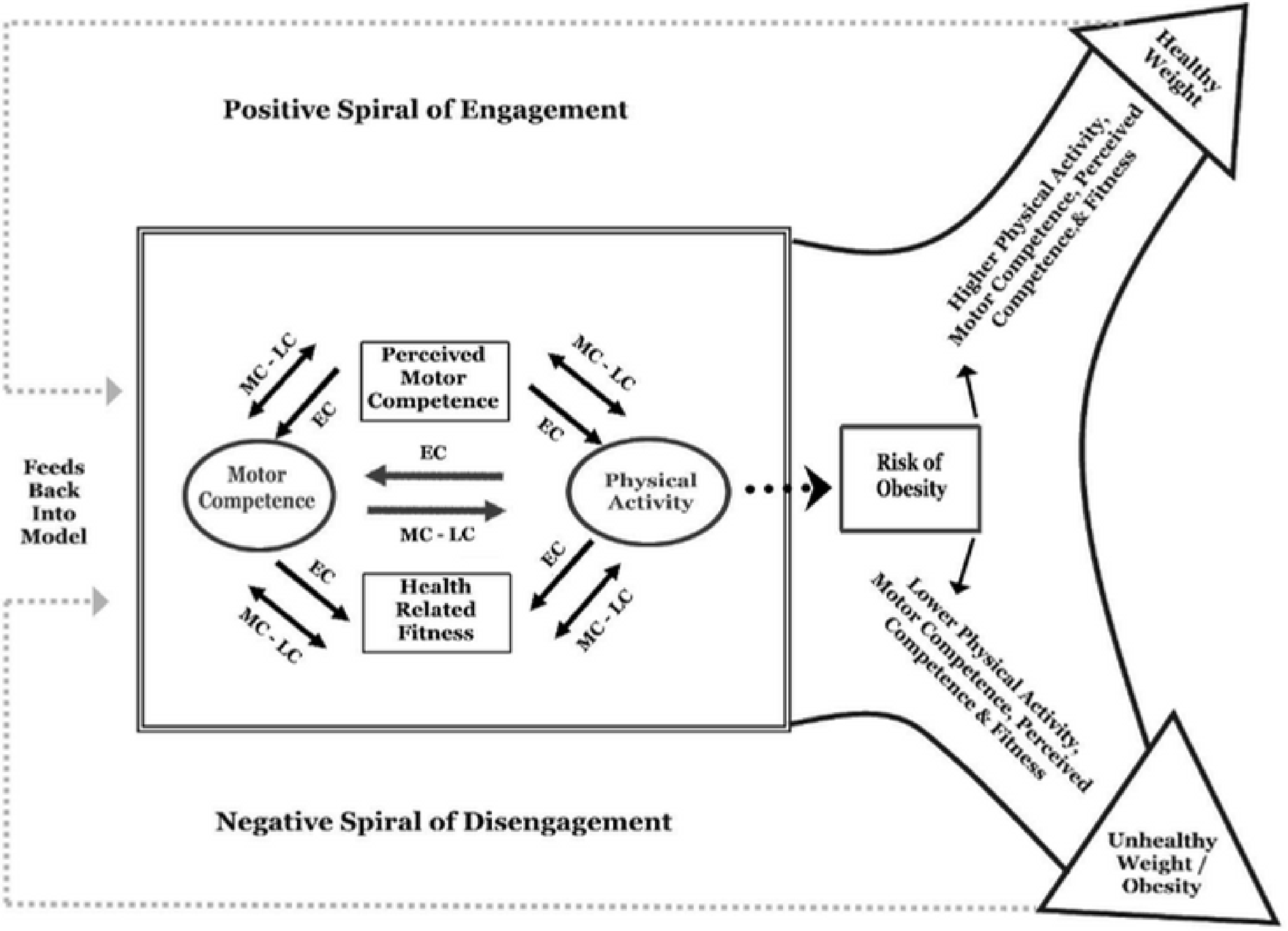
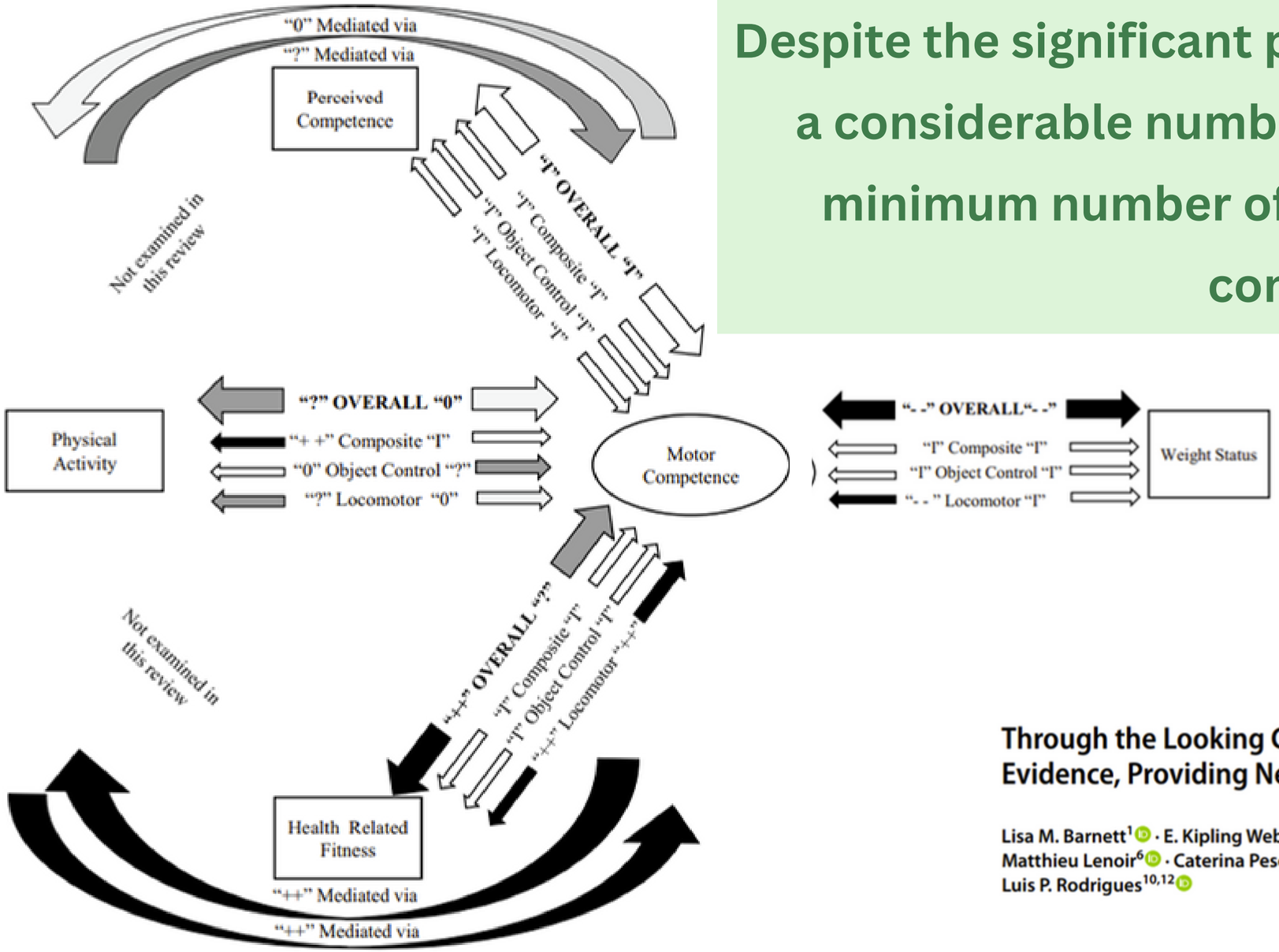



**Figure 1** — Developmental mechanisms influencing physical activity trajectories of children.




**Despite the significant progress in the field, there are a considerable number of pathways without the minimum number of papers to support firmer conclusions**

## Through the Looking Glass: A Systematic Review of Longitudinal Evidence, Providing New Insight for Motor Competence and Health

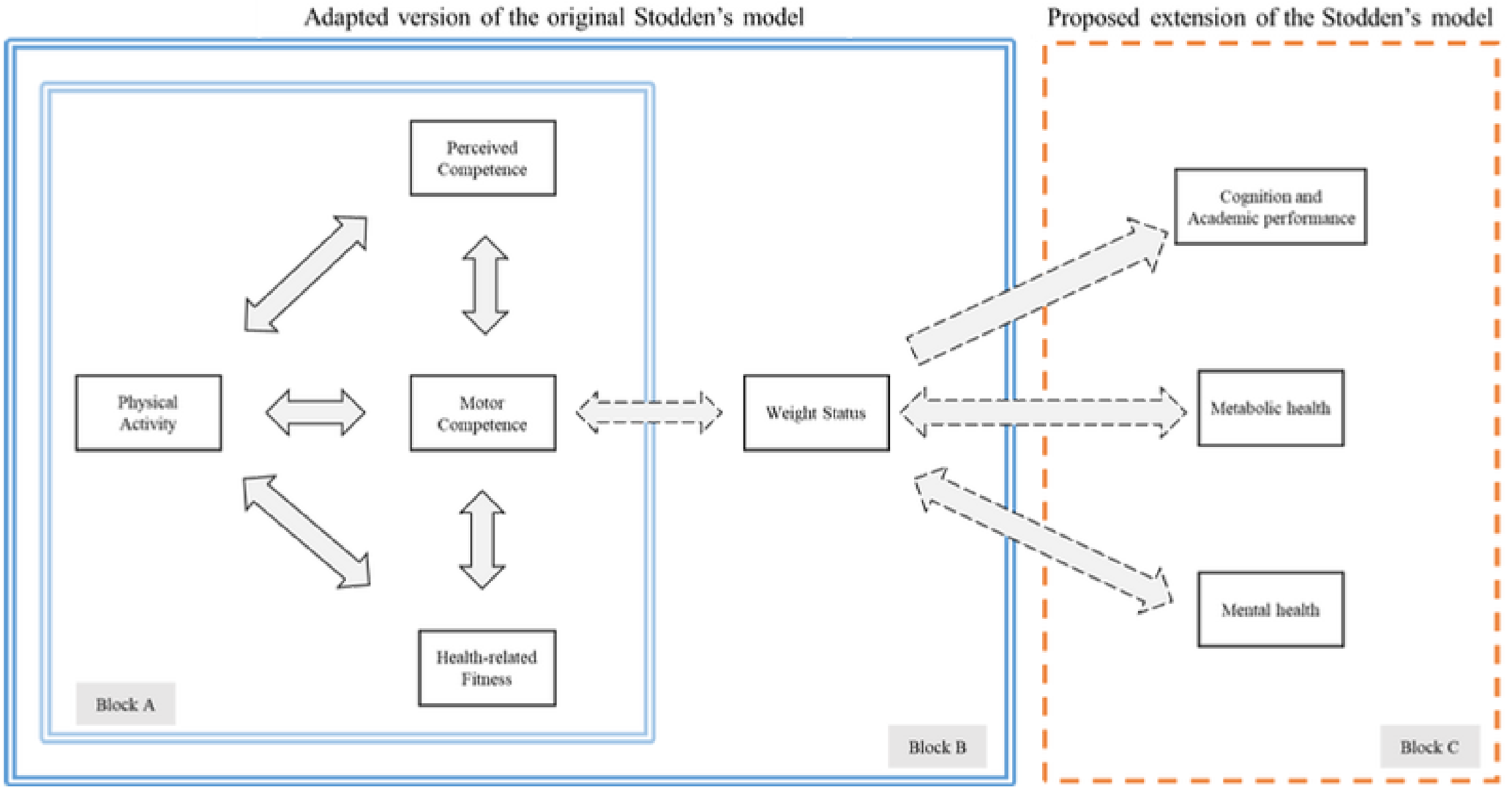
Lisa M. Barnett[1] · E. Kipling Webster[2] · Ryan M. Hulteen[3] · An De Meester[4] · Nadia C. Valentini[5] · Matthieu Lenoir[6] · Caterina Pesce[7] · Nancy Getchell[8] · Vitor P. Lopes[9,10] · Leah E. Robinson[11] · Ali Brian[4] · Luis P. Rodrigues[10,12]

Sports Medicine (2022) 52:875–920
https://doi.org/10.1007/s40279-021-01516-8

# Expansion of Stodden et al.'s Model

Rodrigo A. Lima[1] · Clemens Drenowatz[2] · Karin A. Pfeiffer[3]

Sports Medicine
https://doi.org/10.1007/s40279-021-01632-5



Treating depression with physical activity in adolescents and young adults: a systematic review and meta-analysis of randomised controlled trials

A. P. Bailey[1,2], S. E. Hetrick[1,2], S. Rosenbaum[3,4], R. Purcell[1,2] and A. G. Parker[1,2,5]

*Psychological Medicine* **2018**

Systematic review and meta-analysis of the effects of exercise on depression in adolescents

Xiang Wang, Zhi-dong Cai, Wan-ting Jiang, Yan-yan Fang, Wen-xin Sun and Xing Wang*

Wang *et al.*
*Child and Adolescent Psychiatry and Mental Health* *(2022) 16:16*
https://doi.org/10.1186/s13034-022-00453-2

**16 trials, n =771 (12-25 y) participants; 19 (n=1331)**

**Moderate (SMD = 0.57) to Large (SMD=0.82) effect of physical activity on depression symptoms vs controls**

**Findings remained consistent with clinical samples and in studies with active placebo**

# Depressive symptoms and objectively measured physical activity and sedentary behaviour throughout adolescence: a prospective cohort study

*Aaron Kandola, Gemma Lewis, David P J Osborn, Brendon Stubbs, Joseph F Hayes*

THE LANCET
Psychiatry

**Longitudinal study (ALSPAC data) that monitored over 1200 adolescents from 12 to 16 years with accelerometers and evaluated the longitudinal association with depressive symptoms at 18 y**

**Sedentary behaviour - associated with higher depressive symptoms at 18y**

**LPA - associated with lower depressive symptoms at 18y**

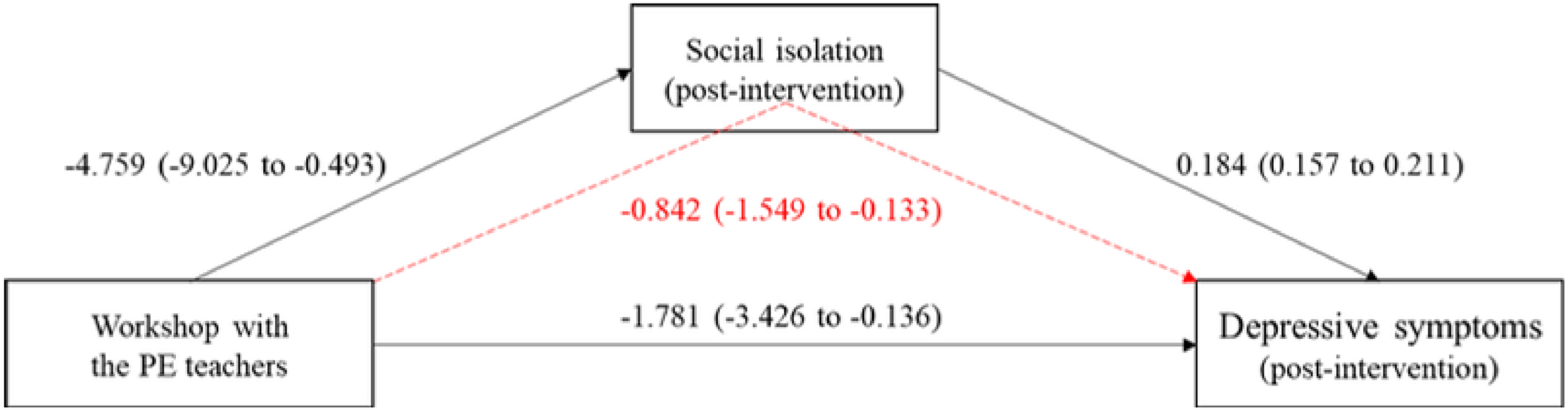
**MVPA - Not associated with depressive symptoms at 18y**

# Universal school-based intervention targeting depressive symptoms in adolescents: A cluster randomized trial

SCANDINAVIAN JOURNAL OF MEDICINE & SCIENCE IN SPORTS

Scand J Med Sci Sports. 2022;32:622–631

Rodrigo Antunes Lima[1,2] | Mauro Virgílio Gomes de Barros[2] | Jorge Bezerra[2]
Simone José dos Santos[2] | Elena Monducci[3] | Maria Rodriguez-Ayllon[4] |
Fernanda Cunha Soares[2]



Universal depression prevention: An umbrella review of meta-analyses

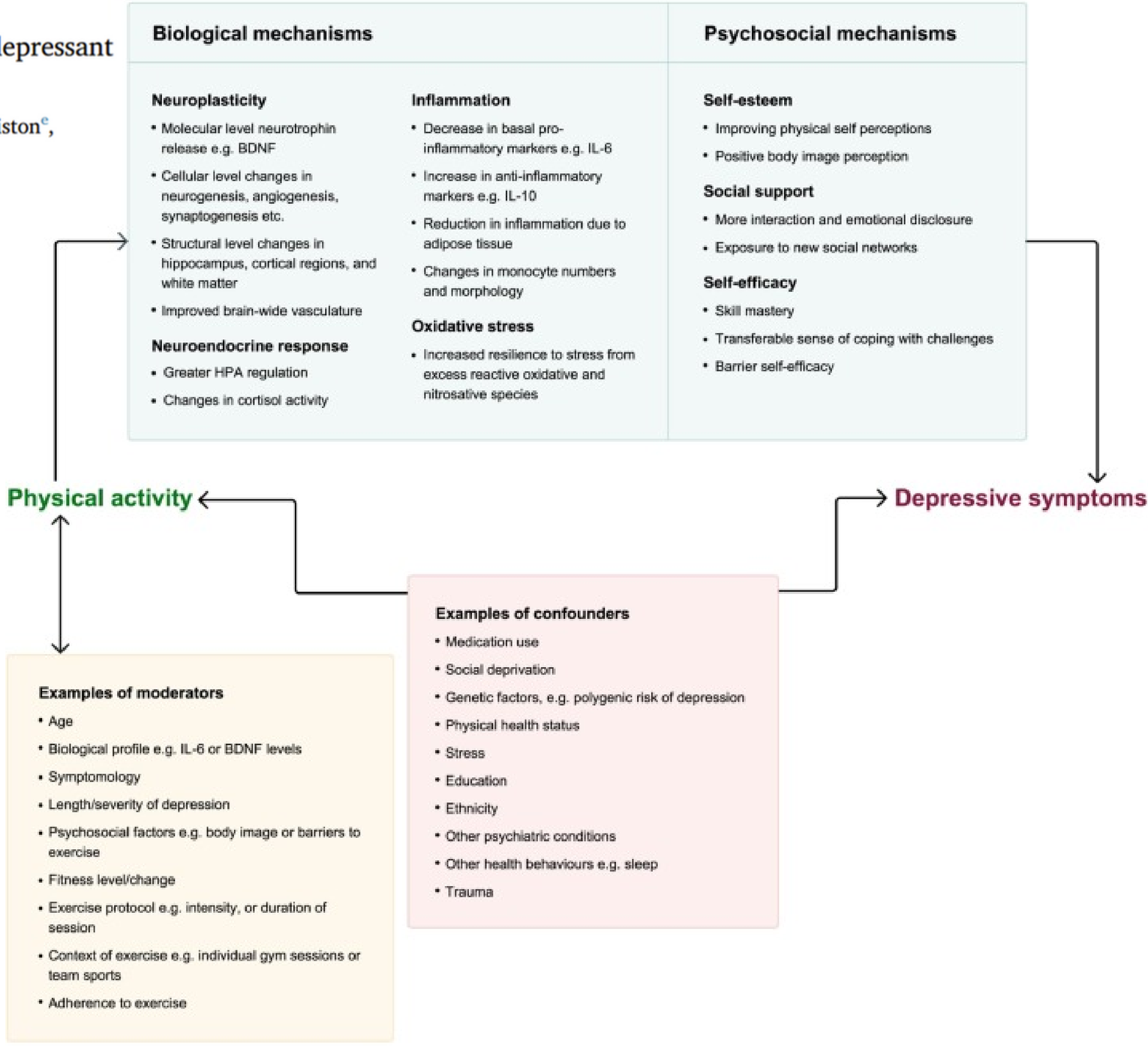
Erin Hoare [a,*], Sam Collins [a], Wolfgang Marx [a], Edward Callaly [a], Ryan Moxham-Smith [a], Pim Cuijpers [i], Arne Holte [h], Andrew A. Nierenberg [j], Nicola Reavley [k], Helen Christensen [l], Charles F. Reynolds III [m], Andre F. Carvalho [a,n,o], Felice Jacka [a,f,g], Michael Berk [a,b,c,d,e]

Journal of Psychiatric Research 144 (2021) 483–493

# There is meta-analytic evidence that physical activity is efficacious for depression prevention

# Physical activity and depression: Towards understanding the antidepressant mechanisms of physical activity

Aaron Kandola[a,*], Garcia Ashdown-Franks[b,c], Joshua Hendrikse[d], Catherine M. Sabiston[e], Brendon Stubbs[b,f]



**If the positive impact of physical activity is so evident, why researchers and public health programs are not managing to increase adolescent physical activity level globally?**

Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1·6 million participants

*Regina Guthold, Gretchen A Stevens, Leanne M Riley, Fiona C Bull*

# Bridging motor and mental health development promotion in schools: the opportunity of new technologies and methods

# Mindsets

# A fixed mindset

Too often, people in general, and adolescents are not different, consider that they inherit a set of skills (IQ, ability to paint, draw, play soccer, run fast, etc.) that are somehow fixed/pre-defined and there is very little room for improvement

A Growth mindset can promote adolescent physical activity by demonstrating that the set of skills needed to perform and enjoy physical activities can be developed with effective strategies, effort, and support from others

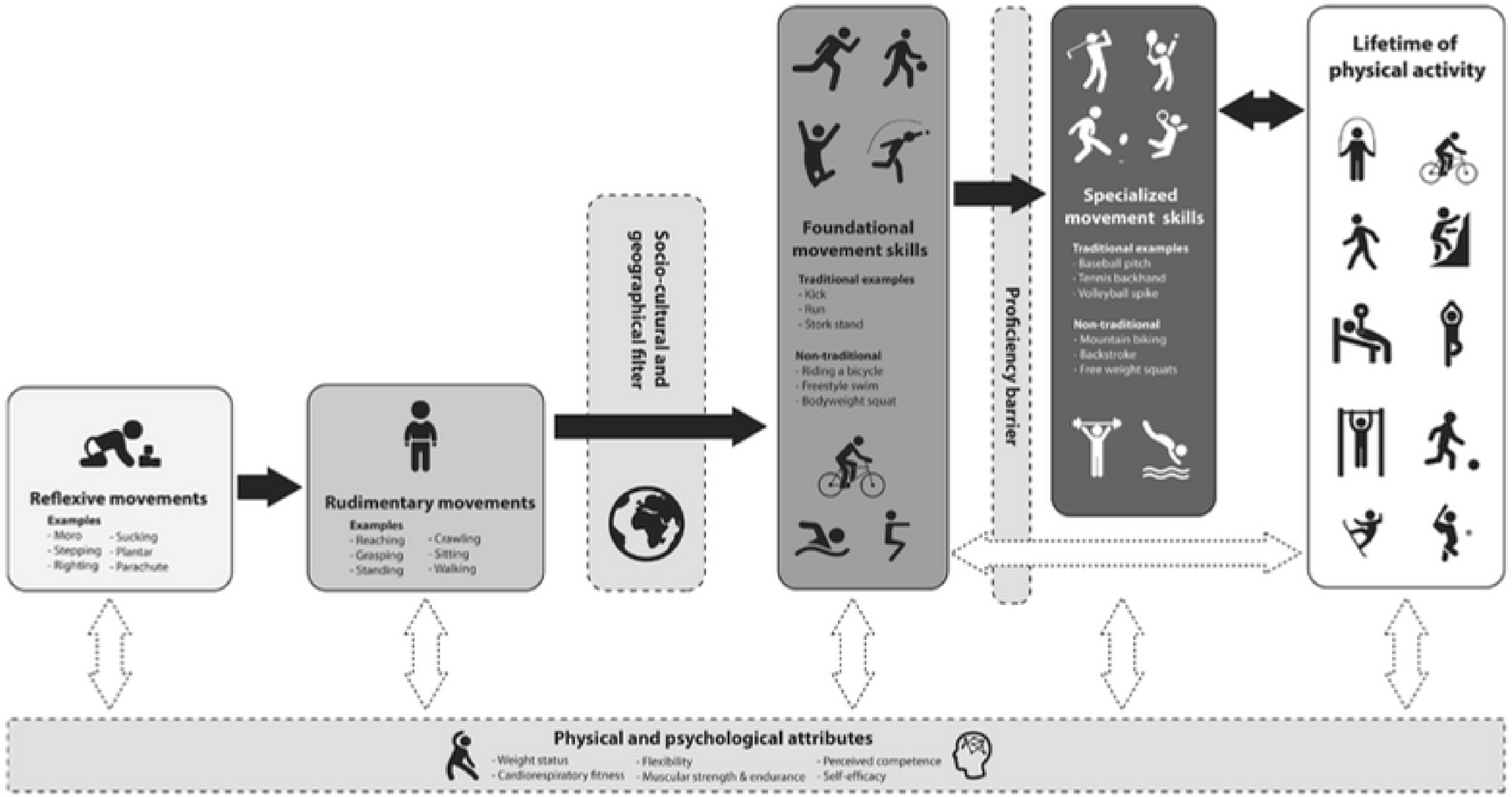
# Growth mindset and known Frameworks used for PA promotion

**Frameworks does not foresee the importance of targeting adolescents' mindset towards physical activity**

**Self-efficacy and Perceived (motor) competence are the closest terms**

- Social Cognitive Theory
- Transtheoretical Model
- Ecological Model of PA
- SAAFE Framework
- Stodden et al.'s model
- RE-AIM
- Self-determination theory
- Social and Emotional Learning

# The importance of self-efficacy and Perceived (motor) competence




Sports Med (2014) 44:1589–1601
DOI 10.1007/s40279-014-0229-z

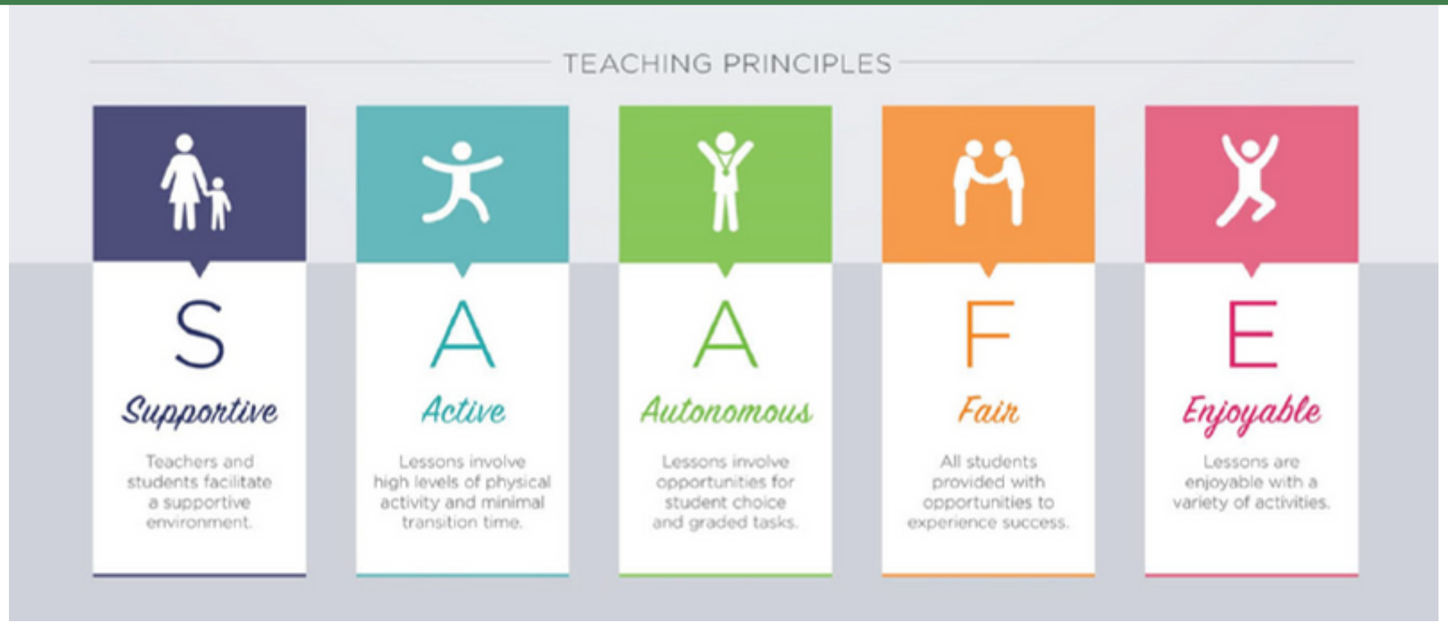
Sports Med (2018) 48:1533–1540
https://doi.org/10.1007/s40279-018-0892-6

# Growth mindset might be the missing link to promote sustainable youth physical activity participation

# A number of studies based on this framework successfully impacted physical activity level and a number of health outcomes

Framework for the design and delivery of organized physical activity sessions for children and adolescents: rationale and description of the 'SAAFE' teaching

Lubans *et al. International Journal of Behavioral Nutrition and Physical Activity* (2017) 14:24
DOI 10.1186/s12966-017-0479-x



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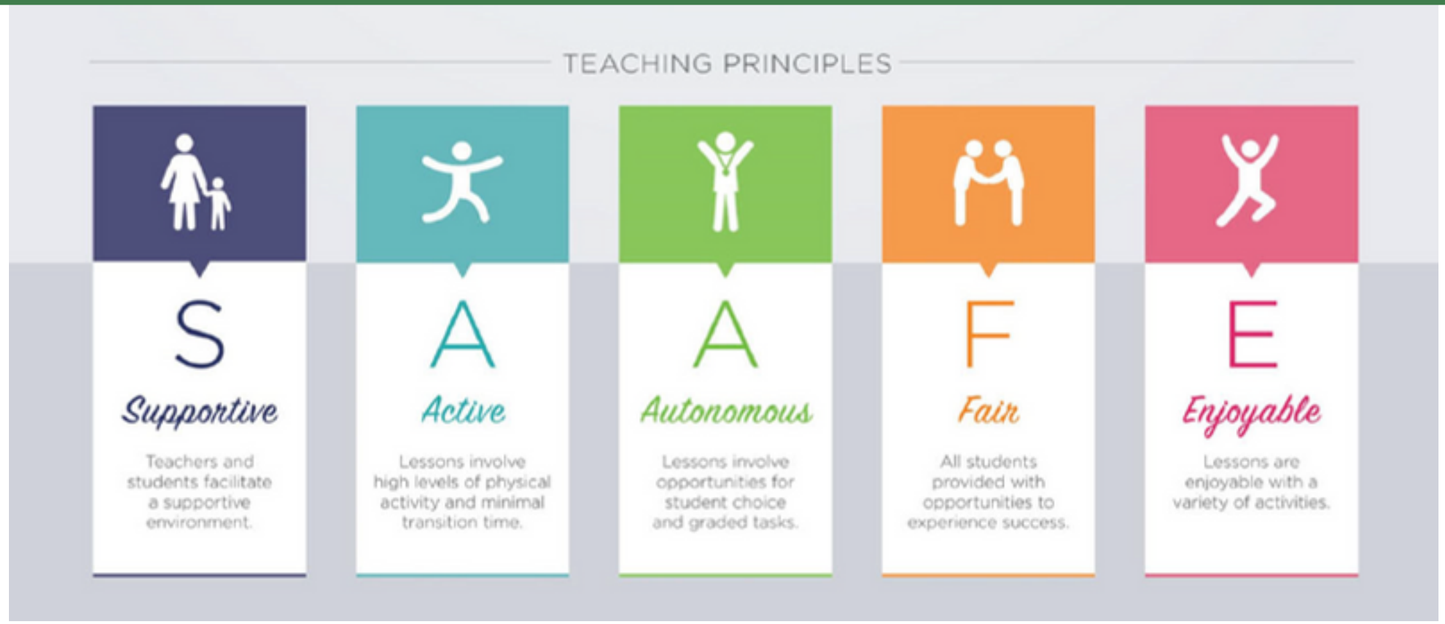



**Implemented at community level**

**Disadvantage settings**

**Cost-effective**

**Suffered to provoke a sustainable change in adolescents PA level**

# Mindsets and adolescent mental health

David S. Yeager & Carol S. Dweck

nature mental health
https://doi.org/10.1038/s44220-022-00009-5

| Fixed mindset | Growth mindset |
| --- | --- |
| An attribute, such as intelligence or an athletic ability, is a fixed trait that cannot be changed | The attribute can be developed through hard work, good strategies and help from others |

## Opposite relation to:

| | |
| --- | --- |
| Resilient responses to obstacles | Attention Bias |
| Internalizing symptoms | ‘All or nothing thinking’ |
| and externalizing behaviours | threat-type stress appraisals |

Mindsets and adolescent mental health

David S. Yeager & Carol S. Dweck

nature mental health

**36% relative reduction in the onset of clinically significant symptoms of depression over the 9-month school year**

A Systematic Review and Meta-Analysis of Growth Mindset Interventions: For Whom, How, and Why Might Such Interventions Work?

Jeni L. Burnette[1], Joseph Billingsley[2], George C. Banks[3], Laura E. Knouse[4], Crystal L. Hoyt[5], Jeffrey M. Pollack[6], and Stefanie Simon[7]

Psychological Bulletin

2023, Vol. 149, Nos. 3–4, 174–205

https://doi.org/10.1037/bul0000368

AMERICAN PSYCHOLOGICAL ASSOCIATION

**8 studies (n=2,529)**

**Growth Mindset intervention in relation to mental health**

**d = 0.32, 95% CI [0.10, 0.54]**

# A synergistic mindsets intervention protects adolescents from stress

David S. Yeager[1]✉, Christopher J. Bryan[2]✉, James J. Gross[3], Jared S. Murray[4,5], Danielle Krettek Cobb[6], Pedro H. F. Santos[4], Hannah Gravelding[7], Meghann Johnson[1] & Jeremy P. Jamieson[7]✉

nature

**30-min self-administered online intervention protects adolescents against stress and stress-related outcomes**

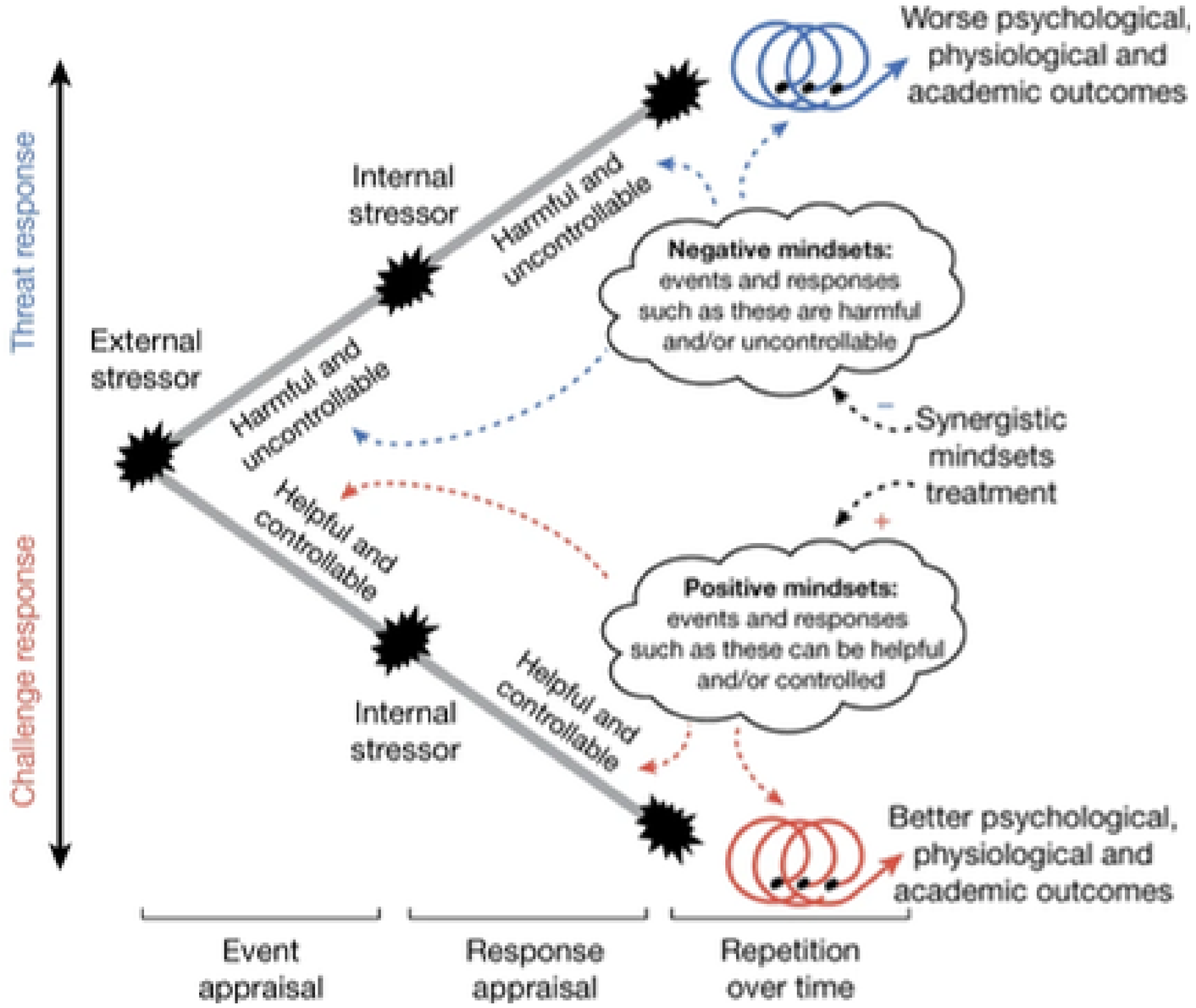
**Growth mindset**

**An ability (intellectual, athletic or musical) is not fixed but can be developed with effort, effective strategies and support from others**

**Stress-can-be-enhancing mindset**

**Our psychophysiological stress response (sweaty palms, racing heart, feeling anxious) can be positive and should be used in our favour**

# Synergistic mindsets intervention reduced maladaptive beliefs by 0.25 s.d. or higher




**6 double blinded experiments to reduce threat-type stress responses; i.e.: that a stressor is harmful and uncontrollable**

# A synergistic mindsets intervention protects adolescents from stress

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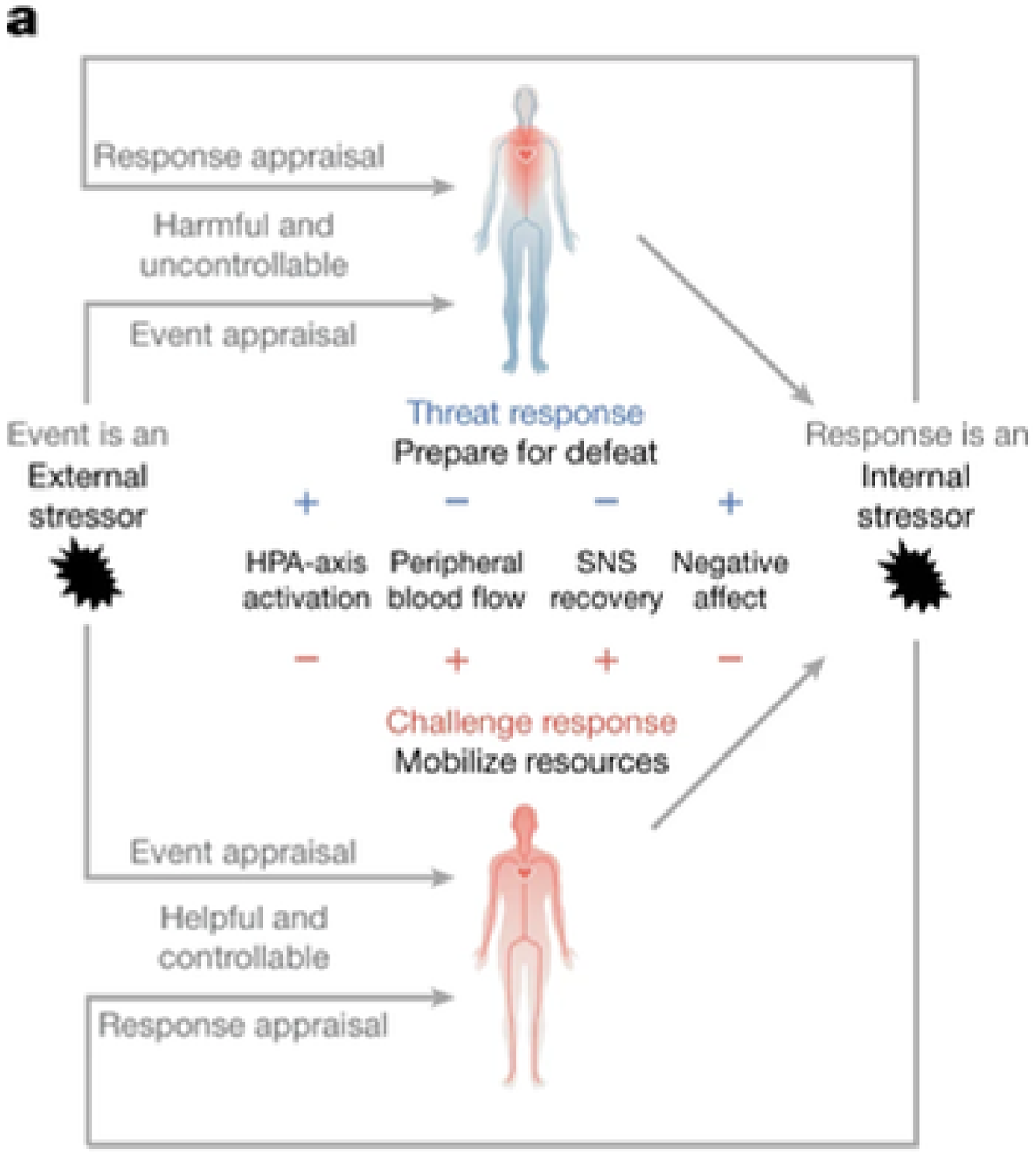
nature

**Participation in physical activities is likely to be perceived as an external stressor, especially among youth with low PA levels, motor competence, and perceived motor and fitness competence**



# A national experiment reveals where a growth mindset improves achievement

David S. Yeager[1*], Paul Hanselman[2*], Gregory M. Walton[3], Jared S. Murray[1], Robert Crosnoe[1], Chandra Muller[1], Elizabeth Tipton[4], Barbara Schneider[5], Chris S. Hulleman[6], Cintia P. Hinojosa[7], David Paunesku[8], Carissa Romero[9], Kate Flint[10], Alice Roberts[10], Jill Trott[10], Ronaldo Iachan[10], Jenny Buontempo[1], Sophia Man Yang[1], Carlos M. Carvalho[1], P. Richard Hahn[11], Maithreyi Gopalan[12], Pratik Mhatre[1], Ronald Ferguson[13], Angela L. Duckworth[14] & Carol S. Dweck[3]

nature

**USA nationwide representative experiment that included around 12,000 9th grade students**

**One-time 50-min self-administered growth mindset intervention**

**Increased, four years later, the number of students from under-represented racial and ethnic minority groups who were graduating from high school with a college-ready portfolio of courses (for example, advanced math and science)**

# A national experiment reveals where a growth mindset improves achievement

David S. Yeager[1*], Paul Hanselman[2*], Gregory M. Walton[3], Jared S. Murray[1], Robert Crosnoe[1], Chandra Muller[1], Elizabeth Tipton[4], Barbara Schneider[5], Chris S. Hulleman[6], Cintia P. Hinojosa[7], David Paunesku[8], Carissa Romero[9], Kate Flint[10], Alice Roberts[10], Jill Trott[10], Ronaldo Iachan[10], Jenny Buontempo[1], Sophia Man Yang[1], Carlos M. Carvalho[1], P. Richard Hahn[11], Maithreyi Gopalan[12], Pratik Mhatre[1], Ronald Ferguson[13], Angela L. Duckworth[14] & Carol S. Dweck[3]

nature

**USA nationwide representative experiment that included around 12,000 9th grade students**

## One-time 50-min self-administered growth mindset intervention

### Lower achieving students:

- Reduced % of fixed mindset
- Higher GPAs by the end of 9th grade
- Higher Math and Sience grades
- RR reduction by 11% from being ‘off track’ for graduation

### High achieving schools:

- Increased growth mindset
- Reduced impact on GPAs and Math and Science grades at 9th grade
- 4 p.p relative increase in the % of students taking advanced math courses at 10th grade

# Growth mindset might be the missing link to promote sustainable youth physical activity participation

eHealth or mHealth can be used to promote a sustainable change in physical activity behaviour and promote mental health in young people?

mHealth Interventions to Reduce Physical Inactivity and Sedentary Behavior in Children and Adolescents: Systematic Review and Meta-analysis of Randomized Controlled Trials

JMIR MHEALTH AND UHEALTH

Effects of Smartphone-Based Interventions on Physical Activity in Children and Adolescents: Systematic Review and Meta-analysis

**mHealth interventions were effective in increasing overall PA level (Effect size: 0.33 to 0.44)**

Universal depression prevention: An umbrella review of meta-analyses

Erin Hoare [a,*], Sam Collins [a], Wolfgang Marx [a], Edward Callaly [a], Ryan Moxham-Smith [a], Pim Cuijpers [i], Arne Holte [h], Andrew A. Nierenberg [j], Nicola Reavley [k], Helen Christensen [l], Charles F. Reynolds III [m], Andre F. Carvalho [a,n,o], Felice Jacka [a,f,g], Michael Berk [a,b,c,d,e]

Journal of Psychiatric Research 144 (2021) 483–493

**Both school- and eHealth-based interventions hold some utility for depression prevention. There is meta-analytic evidence that physical activity is efficacious for depression prevention**

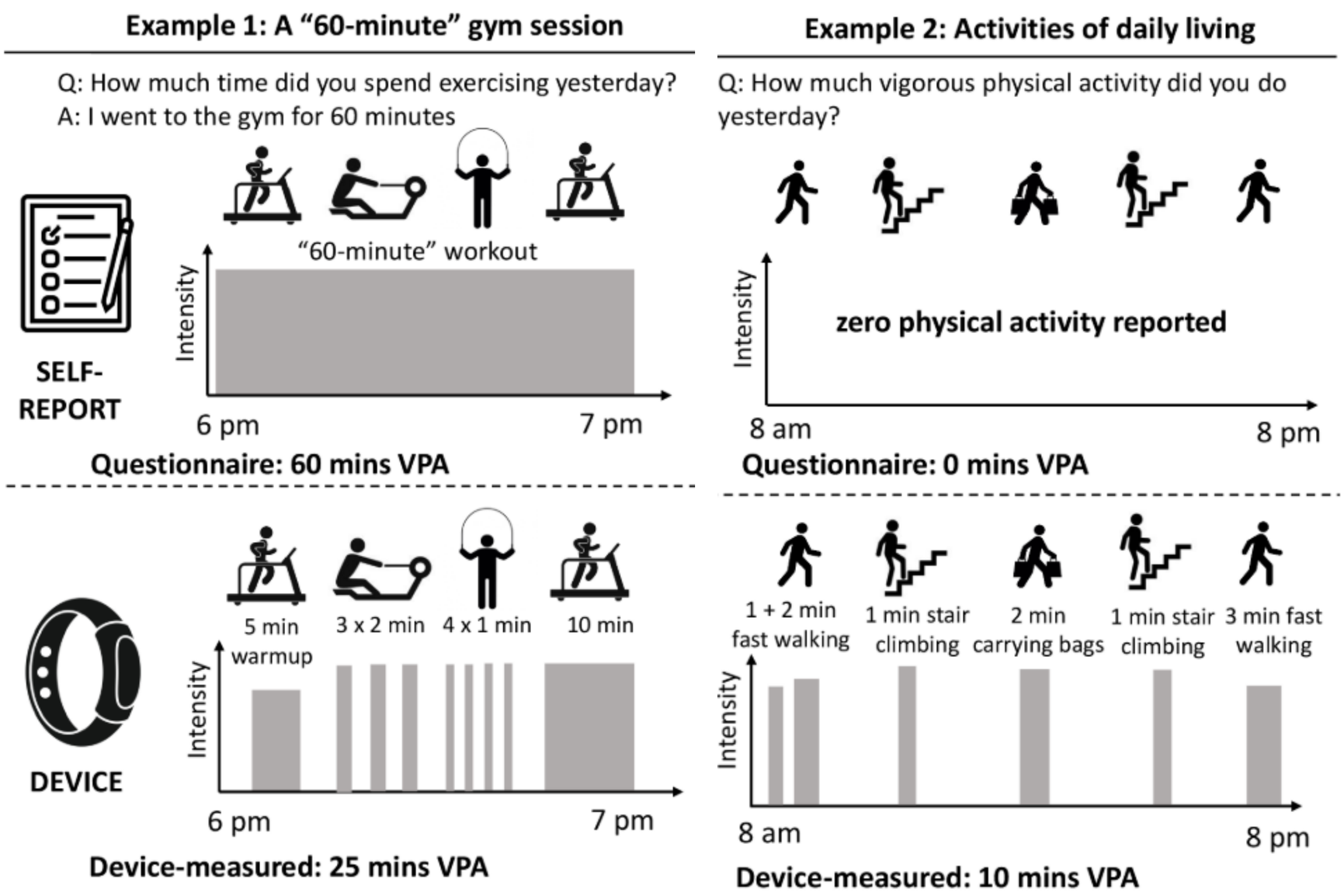
# Advantages of e/mHealth programs

- Monitoring of PA, fitness and motor competence
- The use of Machine learning for categorisation and refining the program
- Google Relative Search Rates, GPS and constant monitoring of smartphones
- Implementation and follow up of interventions
- Continuous updates in the program

# Potential impact of wearables on physical activity guidelines and interventions: opportunities and challenges

Jason MR Gill ,[1] Timothy J Chico ,[2] Aiden Doherty,[3] Jessilyn Dunn,[4] Ulf Ekelund,[5,6] Peter T Katzmarzyk ,[7] Karen Milton ,[8] Marie H Murphy,[9] Emmanuel Stamatakis [10]

BJSM The Journal of Sport & Exercise Medicine

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Holistic School Behavioral Health Symposium

# Bridging motor and mental health development promotion in schools: the opportunity of new technologies and methods

# Grazie

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